



JPW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Krzysztof Palczewski et al.

Application No.: 10/801,078

Filing Date: March 15, 2004

Title: STABILIZED MUTANT OPSIN
PROTEINS

) MAIL STOP

) Group Art Unit: 1618

) Examiner: ZOHREH A FAY

) Confirmation No.: 9475

FIRST
INFORMATION DISCLOSURE STATEMENT
TRANSMITTAL LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is a FIRST Information Disclosure Statement (IDS) and accompanying form PTO-1449 for the above-identified patent application.

- ☒ No additional fee for submission of an IDS is required.
- ☐ The fee of \$ 180 as set forth in 37 C.F.R. § 1.17(p) is also enclosed.
- ☐ A statement under 37 C.F.R. § 1.97(e) is also enclosed.
- ☐ A statement under 37 C.F.R. § 1.97(e), and the fee of \$ 180 as set forth in 37 C.F.R. § 1.17(p) are also enclosed.
- ☐ Charge _____ to Deposit Account No. 02-4800 for the fee due.
- ☐ A check in the amount of _____ is enclosed for the fee due.
- ☐ Charge _____ to credit card for the fee due. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date June 12, 2007

By: 
Brian P. O'Shaughnessy
Registration No. 32747

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Krzysztof Palczewski et al.

Application No.: 10/801,078

Filed: March 15, 2004

For: STABILIZED MUTANT OPSIN
PROTEINS

) **MAIL STOP**

) Group Art Unit: 1618

) Examiner: ZOHREH A FAY

) Confirmation No.: 9475

FIRST INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure as set forth in 37 C.F.R. § 1.56, the accompanying information is being submitted in accordance with 37 C.F.R. §§ 1.97 and 1.98.

Pursuant to 37 C.F.R. § 1.98, a copy of each of the documents cited is enclosed. However, copies of the listed U.S. patents and U.S. patent application publications are not enclosed since it is no longer required.

The documents are being submitted within three (3) months of the filing or entry of the national stage of this application or before the first Office Action on the merits, whichever is later. Since these documents are being filed within the time period set forth in 37 C.F.R. § 1.97(b), no fee or statement is required.

To assist the Examiner, the documents are listed on the attached form PTO-1449. It is respectfully requested that an Examiner initialed copy of this form be returned to the undersigned.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: June 12 2007

By:


Brian R. O'Shaughnessy
Registration No. 32747

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620

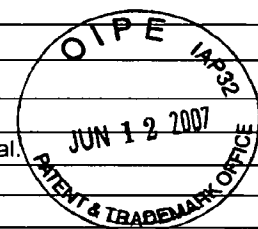
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./

FIRST
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 5

Application Number	10/801,078
Filing Date	March 15, 2004
First Named Inventor	Krzysztof Palczewski et al.
Examiner Name	
Attorney Docket No.	0069509-000003



U.S. PATENT DOCUMENTS

Examiner Initials	Document Number	Kind Code (if known)	Name of Patentee or Applicant of Cited Document	Issue/Publication Date (MM-DD-YYYY)
	3,517,067		Stern, M.H.	06-23-1970
	6,552,009	B2	Achkar	04-22-2003
	6,696,069	B2	Harichian et al.	02-24-2004
	2002/0028849	A1	Godkin et al.	03-07-2002
	2003/0215413	A1	Fares et al.	11-20-2003
	2004/0022766	A1	Acland et al.	02-05-2004
	2004/0097587	A1	Arbiser	05-20-2004

FOREIGN PATENT DOCUMENTS

Examiner Initials	Document Number	Kind Code (if known)	Country	Date of Publication (MM-DD-YYYY)	STATUS						
					Translation	Partial Translation	Eng. Lang. Summary	Search Report	IPER	Abstract	Cited in Spec
	WO 04/082622	A2	PCT	09-30-2004							
	WO 02/082904	A2	PCT	10-24-2002							
	WO 00/68364		PCT	11-16-2000							

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	Acland, G.M. et al., "Gene Therapy Restores Vision in a Canine Model of Childhood Blindness" <i>Nature Genetics</i> , 28:92-95 (May 2001) Nature Publishing Group
	Aggarwal, V.K. et al., "2-Halogeno-1,3-dithiane 1,3-dioxide: a diastereoselective carbonyl anion equivalent in reactions with aldehydes" <i>J. Chem. Soc., Perkin Trans. 1</i> (1997) 11-19
	Albeck, A. et al., "Factors Affecting the Absorption Maxima of Acidic Forms of Bacteriorhodopsin" <i>Biophys. J.</i> , 56:1259-1265 (December 1989), Biophysical Society
	Baehr, W. et al., "The Retinoid Cycle and Retina Disease" <i>Vision Research</i> 43:2957-2958 (2003), www.sciencedirect.com , Elsevier Ltd.
	Batten, M.L. et al., "Lecithin-Retinol Acyltransferase is Essential for Accumulation of All-trans-Retinyl Esters in the Eye and in the Liver" <i>The Journal of Biological Chemistry</i> , 279(11):10422-10432 (March 12, 2004), The American Society for Biochemistry and Molecular Biology, Inc.

Examiner Signature	/Gigi Huang/	Date Considered	03/25/2008
--------------------	--------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with M.P.E.P. § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./

FIRST
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 2 of 5

Application Number	10/801,078
Filing Date	March 15, 2004
First Named Inventor	Krzysztof Palczewski et al.
Examiner Name	
Attorney Docket No.	0069509-000003

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	Beischel et al., "Azidotetrafluorophenyl Retinal Analogue: Synthesis and Bacteriorhodopsin Pigment Formation", <i>Photochemistry and Photobiology</i> , 60(1): 64-68 (1994), American Society for Photobiology
	Biesalski HK et al., "Sensitive Analysis of Retinyl Esters by Isocratic Adsorption Chromatography" <i>J. Clin. Chem. Clin. Biochem.</i> 27(2):65-74 (Feb. 1989) Abstract only
	Boehm, M.F., et al., "Photoaffinity labeling Studies of Bacteriorhodopsin with [15- ³ H]-3-Diazo-4-keto- <i>all-trans</i> -retinal", <i>J. Am. Chem. Soc.</i> 112:7779-7782 (1990), American Chemical Society
	Borhan, B. et al., "Efficient Synthesis of 11- <i>cis</i> -Retinoids", <i>Chem.Eur.J.</i> 5(4):1172-1175 (1999), Wiley-VCH Verlag GmbH
	Borhan, B. et al., "Chemoenzymatic Synthesis of 1- <i>cis</i> -Retinal Photoaffinity Analog by Use of Squid Retinochrome", <i>J. Am. Chem. Soc.</i> 119:5758-59 (1997), American Chemical Society
	Caldwell, C.G. et al., "Synthesis of Retinals with Eight- and Nine-Membered Rings in the Side Chain. Models for Rhodopsin Photobleaching Intermediates" <i>J. Org. Chem.</i> 58:3533-3537 (1993) American Chemical Society
	Capecchi, M.R., "Altering the Genome by Homologous Recombination" <i>Science</i> , New Series, 244(4910):1288-1292 (1989) American Association of the Advancement of Science
	Colmenares et al., "11,12-Difluororhodopsin and Related Odd-Numbered Fluororhodopsins. The Use of J _{F,F} for Following a Cis-trans Isomerization Process", <i>J. Am. Chem. Soc.</i> 121:5803-04 (1999), American Chemical Society
	Crescitelli et al., "The Spectral Properties and Photosensitivities of Analogue Photopigments Regenerated with 10- and 14-substituted Retinal Analogues" <i>Proc. R. Soc. Lond. B</i> 233:55-76 (1988)
	Crouch, R.K., "Yearly Review: Studies of Rhodopsin and Bacteriorhodopsin Using Modified Retinals", <i>Photochemistry and Photobiology</i> , 44(6):803-807 (December 1986), Pergamon Press
	Crouch, R. et al. "Opsin Pigments Formed with Acyclic Retinal Analogues", <i>FEBS</i> 0554, 158(1):139-142 (July 1983), Elsevier Science Publishers B.V.
	Driessen CA et al., "Disruption of the 11- <i>cis</i> -retinol Dehydrogenase Gene Leads to Accumulation of <i>cis</i> -retinols and <i>cis</i> -retinyl Esters", <i>Mol. Cell Biol.</i> 20(12):4275-87 (June 2000), American Society for Microbiology
	Ebrey, T. et al., "Properties of Several Sterically Modified Retinal Analogs and Their Photosensitive Pigments", <i>Biochemistry</i> 14(18):3933-3941 (1975)
	Eyring, G. et al., "Assignment and Interpretation of Hydrogen Out-of-Plane Vibrations in the Resonance Raman Spectra of Rhodopsin and Bathorhodopsin" <i>Biochemistry</i> 21:384-393 (1982)
	Fujimoto, Y. et al., "On the Bioactive Conformation of the Rhodopsin Chromophore: Absolute Sense of Twist around the 6- <i>s-cis</i> Bond" <i>Chem. Eur. J.</i> 7(19):4198-4204 (2001), WILEY-VCH Verlag GmbH

Examiner Signature	/Gigi Huang/	Date Considered	03/25/2008
--------------------	--------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with M.P.E.P. § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./

FIRST
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 3 of 5

Application Number	10/801,078
Filing Date	March 15, 2004
First Named Inventor	Krzysztof Palczewski et al.
Examiner Name	
Attorney Docket No.	0069509-000003

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	Fujimoto, Y. et al., "Solution and Biologically Relevant Conformations of Enantiomeric 11- <i>cis</i> -Locked Cyclopropyl Retinals", <i>J. Am. Chem. Soc.</i> 124:7294-7302 (2002), American Chemical Society
	Gärtner, W. et al., "Quantum Yield of Chapso-Solubilized Rhodopsin and 3-Hydroxy Retinal Containing Bovine Opsin", <i>Photochemistry and Photobiology</i> , 54(6):1047-1055 (December 1991), Pergamon Press
	Han, M. et al., "The C9 Methyl Group of Retinal Interacts with Glycine-121 in Rhodopsin", <i>PNAS</i> 94:13442-13447 (1997), The National Academy of Sciences
	Hiraki K. et al., "Bacteriorhodopsin Analog Regenerated with 13-Desmethyl-13-Iodoretinal" <i>Biophysical Journal</i> 83:3460-3469 (2002), The Biophysical Society
	Hirano T., et al., "Constraints of Opsin Structure on the Ligand-binding Site: Studies with Ring-fused Retinals" <i>Photochemistry and Photobiology</i> 76(6):606-615 (2002) American Society for Photobiology
	Hu, S. et al., "Unbleachable Rhodopsin with an 11- <i>cis</i> -Locked Eight-Membered Ring Retinal: The Visual Transduction Process" <i>Biochemistry</i> 33:408-416 (1994), American Chemical Society
	Imai, H. et al., "Probing for the Threshold Energy for Visual Transduction: Red-Shifted Visual Pigment Analogs from 3-Methoxy-3-Dehydroretinal and Related Compounds", <i>Photochemistry and Photobiology</i> , 70(1):111-115 (July 1999), Pergamon Press
	Imamoto Y., et al., "Structure Around C ₆ -C ₇ Bond of the Chromophore in Bathorhodopsin: Low-Temperature Spectroscopy of 6 <i>s-cis</i> -Locked Bicyclic Rhodopsin Analogs" <i>Biochemistry</i> 35:6257-6262 (1996), American Chemical Society
	Jang, G. "Mechanism of Rhodopsin Activation as Examined with Ring-Constrained Retinal Analogs and the Crystal Structure of the Ground State Protein", <i>The Journal of Biological Chemistry</i> , 276(28):26148-26153 (2001), JBC papers in Press
	Karnaukhova E., et al., "Bioactivity of Visual Pigments with Sterically Modified Retinal Analogs", <i>Bioorganic Chemistry</i> 27:372-382 (1999), Academic Press
	Kuksa V. et al., "Biochemical and Physiological Properties of Rhodopsin Regenerated with 11- <i>cis</i> -6-Ring- and 7-Ring-retinals" <i>The Journal of Biological Chemistry</i> , 277(44):42315-42324 (Nov. 1, 2002) The American Society for Biochemistry and Molecular Biology, Inc.
	Kuksa V., et al. "Retinoid Cycle in the Vertebrate Retina: Experimental Approaches and Mechanisms of Isomerization", <i>Vision Research</i> 43:2959-2981 (2003), Elsevier Ltd.
	Lewin, A.H. et al, "Synthesis and Characterization of <i>trans</i> -, 13- <i>cis</i> -, and 11- <i>cis</i> ,13- <i>cis</i> -12-(Hydroxymethyl)retinols", <i>J. Org. Chem.</i> 49:649-652 (1984), American Chemical Society
	Lewis J.W., et al., "Steric Barrier to Bathorhodopsin Decay in 5-Demethyl and Mesityl Analogues of Rhodopsin" <i>J. Am. Chem. Soc.</i> 123:10024-10029 (2001), American Chemical Society
	Lin et al., "Vibrational Assignment of Torsional Normal Modes of Rhodopsin: Probing Excited-State Isomerization Dynamics along the Reaction C ₁₁ =C ₁₂ Torsion Coordinate", <i>J. Phys. Chem. B</i> 102:2787-2806 (1998), American Chemical Society, published on Web 3/24/1998

Examiner Signature	/Gigi Huang/	Date Considered	03/25/2008
--------------------	--------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with M.P.E.P. § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./

FIRST
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

(use as many sheets as necessary)

Application Number	10/801,078
Filing Date	March 15, 2004
First Named Inventor	Krzysztof Palczewski et al.
Examiner Name	
Attorney Docket No.	0069509-000003

Sheet 4 of 5

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	Maeda T. et al., "Evaluation of the Role of the Retinal G Protein-Coupled receptor (RGR) in the Vertebrate Retina <i>in vivo</i> " <i>Journal of Neurochemistry</i> 85:944-956 (2003), International Society for Neurochemistry
	Mata J.R. et al., "Substrate Specificity of retinyl Ester Hydrolase Activity in Retinal Pigment Epithelium", <i>Journal of Lipid Research</i> 39:604-612 (1998)
	Maxwell, W.A. et al., "Photodynamic Responses in <i>Rhodotorula Glutinis</i> in the Absence of Added Sensitizers", <i>Photochemistry and Photobiology</i> , 13(3):259-273, (March 1971) Pergamon Press
	Mizukami T., et al., "Photoisomerization Mechanism of the Rhodopsin Chromophore: Picosecond Photolysis of Pigment Containing 11-cis-Locked Eight-Membered Ring Retinal", <i>PNAS</i> , 90:4072-4076 (1993)
	Paik, J. et al., "9-cis-retinoids: Biosynthesis of 9-cis-retinoic Acid", <i>Biochemistry</i> 39(27):8073-84 (July 2000) Abstract only
	Rao, V.J. et al., "5-(Trifluoromethyl)bacteriorhodopsin Does not Translocate Protons", <i>J. Am. Chem. Soc.</i> 108:6077-6078 (1986), American Chemical Society
	Rao, V.J. et al., "Regioselective Photo Isomerisation of Retinolacetate" <i>Tetrahedron Letters</i> , 31(24):3441-44 (1990), Pergamon Press
	Redmond, T. M. et al., " <i>Rpe65</i> is Necessary for Production of 11-cis-Vitamin A in the Retinal visual Cycle" <i>Nature Genetics</i> 20:344-351 (1998) Nature America, Inc.
	Reid, R. et al., "Mass Spectral Analysis of Eleven Analogs of Vitamin A", <i>Lipids</i> , 8(1):558-565 (January 1973) American Oil Chemists' Society
	Renk, "A Rhodopsin Pigment Containing a Spin-Labeled Retinal" <i>J. Am. Chem. Soc.</i> 109:6163-6168 (1987), American Chemical Society
	Rezabek, MS, et al., "Effects of Dietary Retinyl Acetate on the Promotion of Hepatic Enzyme-Altered Foci by Polybrominated Biphenyls in Initiated Rats", <i>Food Chem. Toxicol.</i> 27(8):539-44 (Aug. 1989) Abstract only
	Sekiya, N. et al., "Effect of Modification of the Chromophore in Retinochrome" <i>Biophysical Chemistry</i> 56:31-39 (1995), Elsevier Science B.V.
	Sen, R. et al., "Synthesis and Binding Studies of a Photoaffinity Label for Bovine Rhodopsin" <i>J. Am. Chem. Soc.</i> 104:3214-3216 (1982), American Chemical Society
	Spaeth, G.L., "Ophthalmic Surgery: Principles & Practice, Second Edition", pp. 85-99 (1990), Harcourt Brace Jovanich, Inc.
	Stecher, H. et al., "Preferential Release of 11-cis-retinol from Retinal Pigment Epithelial Cells in the Presence of Cellular Retinaldehyde-binding Protein" <i>The Journal of Biological Chemistry</i> 274(13):8577-8585 (March 26, 1999) The American Society for Biochemistry and Molecular Biology, Inc.
	Steinberg, G. et al., "Isomer Composition and Spectra of the Dark and Light Adapted Forms of Artificial Bacteriorhodopsins", <i>Photochemistry and Photobiology</i> , 54(6):969-976 (December 1991), Pergamon Press

Examiner Signature	/Gigi Huang/	Date Considered	03/25/2008
--------------------	--------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with M.P.E.P. § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./

FIRST
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 5 of 5

Application Number	10/801,078
Filing Date	March 15, 2004
First Named Inventor	Krzysztof Palczewski et al.
Examiner Name	
Attorney Docket No.	0069509-000003

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	Tan, Q., et al., "Absolute Sense of Twist of the C12-C13 Bond of the Retinal Chromophore in Bovine Rhodopsin Based on Exciton-Coupled CD Spectra of 11,12-Dihydroretinal Analogues", <i>Agnew. Chem. Int. Ed. Engl.</i> 36(19):2089-2093, WILEY-VCH Verlag GmbH
	Teller, D.C. et al., "Advances in Determination of a High-Resolution Three-Dimensional Structure of Rhodopsin, a Model of G-Protein-Coupled Receptors (GPCRs)", <i>Biochemistry</i> 40(26):7761-72 (2001), American Chemical Society
	Thompson, D.A. et al., "Gene Defects in Vitamin A Metabolism of the Retinal Pigment Epithelium", <i>Genetics in Ophthalmology</i> , 37:141-154 (2003), S. Karger AG, Basel
	Van Hooser, J.P. et al., "Rapid Restoration of Visual Pigment and Function with Oral Retinoid in a Mouse Model of Childhood Blindness", <i>PNAS</i> , 97(15):8623-8628 (2000)
	Van Hooser, J.P. et al., "Recovery of Visual Functions in a Mouse Model of Leber Congenital Amaurosis", <i>The Journal of Biological Chemistry</i> , 277(21):19173-19182 (2002), The American Society for Biochemistry and Molecular Biology, Inc.
	Wada, A. et al., "Retinoids and Related Compounds. Part 26. Synthesis of (11Z)-8,18-propano- and methano-retinals and conformational study of the rhodopsin chromophore", <i>J. Chem. Soc., Perkin Trans. 1</i> (2001) 2430-2439, The Royal Society of Chemistry
	Wingerath, T., et al., Analysis of Cyclic and Acyclic Analogs of Retinol, Retinoic Acid, and Retinal by Laser Desorption Ionization-, Matrix-Assisted Laser Desorption Ionization-Mass Spectrometry, and UV/Vis Spectroscopy", <i>Analytical Biochemistry</i> 272:232-242 (1999) Academic Press
	Yamamoto Y. et al., "Important Role of the Proline Residue in the Signal Sequence That Directs the Secretion of Human Lysozyme in <i>Saccharomyces cerevisiae</i> " <i>Biochemistry</i> 28:2728-2732 (1989), American Chemical Society
	Yan, B. et al., "Mechanism of Activation of Sensory Rhodopsin I: Evidence for a Steric Trigger", <i>PNAS</i> , 88:9412-9416 (1991)

Examiner Signature	/Gigi Huang/	Date Considered	03/25/2008
--------------------	--------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with M.P.E.P. § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.H./